

## **E-Finance and the Financial Services Industry**

### **2).E-FINANCE AS INFORMATION SERVICE PROVIDER**

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This section begins by describing how different kinds of financial services firms,depository institutions, insurance companies and securities companies, have deployed e-finance technologies. Then, we discuss how these new technologies have reshaped the role and structure of the financial services sector. We attempt throughout the section to draw out the research questions and policy issues raised by the advent of new e- finance technologies.

#### **A. Adoption of e-finance by financial services firms**

##### **Financial Intermediaries**

By the end of the 1990s, e-finance technologies had arguably affected all aspects of the business of banking and financial intermediation, with the possible exception of lending to large businesses. Depository institutions have used electronic information technologies, for example, to make credit decisions to consumers since the 1980s. Having computation abilities that allow the use of large databases has made this possible. For consumers, the application and approval process for both mortgages and credit cards has become sufficiently automated so that it can be done without any personal contact with the lender. The ability to make these credit decisions in this way depends crucially on standardized information provided to lenders by a small number of credit bureaus that keep track of individuals' credit histories. With respect to credit cards, their use as a medium to make payments, along with debit cards, has grown dramatically, fueled by rapid communications technologies that allow vendors to validate a person's credit worthiness in seconds.

In recent years, information technologies have also been used systematically for lending to small businesses. Since the early 1990s, banks and finance companies have been using credit scoring models to lend to small businesses on a wide scale. These models use information about borrower quality, such as the credit history of the proprietor, to estimate the likelihood that a particular small business loan will default; loan applications with a sufficiently low default likelihood (high "score") are granted. Survey evidence suggests that large banks have been the first to use credit

scoring for their small business loans, and that these models are generally used only for very small, small business loans such as those under \$100,000 (Mester 1997). Smaller banks have also gotten access to credit scoring technologies, however, through the efforts of third parties such as Fair Isaac. These companies aggregate information on the performance of loans to many small businesses (and other borrowers) to produce generic credit scores that can be used by any lender, large or small. In this way, these third parties allow smaller financial institutions to take advantage of a technology that comes with very substantial scale economies.

The widespread use of these information technologies have made it increasingly easy for banks to remain at “arm’s length” from their borrowers. Over the past two decades, for example, the probability that a bank communicates with its small business borrower in person rather than with the phone or mail has declined from 59 percent in 1973 to 36 percent in 1993. Moreover, the average geographical distance from a bank to its typical small business borrower has increased from 16 miles during the 1973-79 period to 68 miles during the 1990-93 period (Petersen and Rajan, 2001).

Surveys by the Federal banking regulators suggest that depository institutions in very recent years have also invested heavily in e-finance technologies (e.g. website on the internet) as a means to distribute their products to retail customer. As described by Furst et al. (this volume), by 1999 banks with transactional websites – websites capable of allowing customers to conduct business – held more than 90 percent of banking assets. Banks have used the internet as an alternative means to distribute their traditional credit and payments products to retail customers.

For example, Furst et al. find that most internet banks offer balance inquiry and funds transfer, bill payment and credit applications online. In contrast, fewer banks with transactional websites offer brokerage, cash management, fiduciary or insurance services online, although this may reflect the fact that fewer banks provide these services.

The rapid increase in the use of the internet represents a continuation of banks’ efforts to replace their costly branch network with alternative distribution channels such as the telephones, the mail and Automated Teller Machines (Radecki, Wenninger and Orlow, 1997). Although ATMs have existed since the middle of the 1970s, their numbers have grown dramatically in recent times. Having said that, the number of offices at banks and savings institutions continues to grow, although slowly. Over the second half of the 1990s, for example, the total number of offices at depositories rose from about 80,000 in 1995 to a little more than 85,000 in 2000.

Furst et al. also find that large banks have adopted these technologies very aggressively during the late 1990s, and that these technologies have been associated with relatively high profits and efficiency. An open question, however, is whether adoption of the internet (and other E-finance technologies) has itself enhanced profits, or whether the more efficient and higher profits banks were simply first to adopt the technology. They report that *de novo* banks that attempt to use websites as their primary means for interacting with customers have not been successful to date, suggesting that e-finance technologies cannot supplant traditional distribution channels entirely. This suggests a slightly broader question: are banks using the internet to enhance their existing delivery channels (“bricks and clicks”) or to supplant them (“bricks or clicks”)? In other words, are branches and websites substitutes or complements?

#### Insurance

Like the securities underwriting business, the insurance industry also has not seemed to adopt e-finance technologies in large numbers yet. For example, in 1999 12% of US insurers used the internet to sell products amounting to 1% of the total sales (Banks, 2001). Insurance companies tend to buy and hold securities (mainly debt securities) issued or originated by someone else, thus limiting the potential usefulness of e-finance on the asset side of the business. On the liability side, slow adoption of e-finance technologies may reflect the relative infrequency with which an insurer and retail customer interact. In contrast to bank depositors, policyholders generally interact with their insurer only at the time of sale and when filing a claim. Also in contrast to banking services, insurance policies tend to be quite heterogeneous and consumers tend not to be well informed about the products, making automation of the sales process difficult. Differences in regulation may also play a role. The issue of why the insurance industry has been relatively slow to use the internet needs further study.

### Securities Firms

E-finance has also affected the securities industry, particularly for the broker-dealers in the secondary securities markets. During the 1990s, the discount brokerage business rapidly gained market share. Discounters typically rely on fees from retail customers with few ancillary services, thereby allowing individuals to trade securities at very low cost. From 1990 to 1999, employment at discount brokers rose from 2.4 percent to 5.3 percent of total employment in the securities industry. Moreover, the discounters enjoyed a higher profit rate (pre-tax return on equity) than national full-line securities firms or large investment banks in every year from 1990 to 1999 (Securities Industry Fact Book, 2000).

Will e-finance technologies reshape the primary securities markets to the same extent that it has affected the brokerage business? The traditional approach to bringing a new security to the primary market involves "book building," a process by which investment banks assess the demand for a security issuance from a small number of well-connected institutional investors before finalizing the terms of the offering. Wilhelm (1999) argues that the relationship-based approach to book building has allowed information to be collected efficiently in an environment of high search and information costs. By lowering these search and information costs, however, e-finance technologies may reduce the comparative advantage of the relationship-based approach relative to a more arm's length process, such as an online auction.

Some online IPOs have succeeded over the past five years, beginning with the Spring Street Brewery in 1995 (Banks 2001). More than 3,500 people bought shares in the \$1.6 million offering over the internet. The shares were subsequently traded on an internet bulletin board called Wit-trade. The SEC investigated the primary issue market and the secondary trading and issued a no-action letter. In 1999, W.R. Hambrecht created an online auction (OpenIPO) available to any individual or institutional investor that has brought several companies public. OpenIPO operates a Dutch auction in which participants pay the minimum price necessary to sell all of the shares offered. According to the Hambrecht website, six companies have used the OpenIPO format successfully since 1999. Whether the online auction model of securities underwriting represents a real threat to traditional securities underwriting methods remains to be seen. Many studies have found that securities are underpriced when first sold to the

public, suggesting that issuers sacrifice substantial amounts of capital by using the traditional underwriting approach (Loughran, Ritter and Rydqvist 1995). Thus, an important question for future empirical research is whether securities sold in an open auction yield less underpricing than securities sold using the traditional, relationship-based technology.

## **B. The Effects of E-finance on the Financial Services Sector**

### **Disintermediation**

The advent of e-finance technologies furthers the long-standing evolution of the financial services sector from one dominated by financial intermediaries to one dominated by capital markets and financial institutions that hold *marketable* securities as assets. Traditional financial intermediaries transform illiquid, hence non- marketable, assets (e.g. bank loans) into liquid liabilities (e.g. demand deposits). This role has become less important over time as the liquidity of financial assets originated by intermediaries has increased. Liquidity depends crucially on the ability of buyers and sellers to agree on the value of a financial asset. Liquidity is reduced by asymmetric information – sellers knowing more than buyers – because buyers assume, rationally, that informed sellers want to keep high quality assets and sell low quality ones. E-finance technologies reduce asymmetric information because they lower the costs of communication, computation and data processing, thus allowing buyers and sellers of financial assets to have more equal access to information.

Securitization of small business loans offers a concrete example of how e-finance technologies enhance the liquidity of a formerly illiquid class of financial assets. Small business lending had traditionally been based on information developed from a long-term relationship between lender and borrower. As a result, outsider investors had no reliable way to evaluate these loans and they remained illiquid. Over the past decade, however, banks and finance companies have begun to replace relationship-based lending with an automated credit scoring system that allows outside rating agencies to evaluate the credit risks inherent in a pool of these loans. According to a recent Federal Reserve Board Report on Congress (2000), more than 300 large small business lenders use a common credit scoring system developed by Fair Isaac. Because pools of small business loans can now be standardized and rated, securitization of small business loans have been able to occur, growing *tenfold* between 1995 and 1999, from \$241 million to \$2.3 billion.

While the growth rates are impressive, securitization of small business loans has remained a small part of this market. In lending to consumers, however, securitization has become widespread. By the end of the 1990s, over half of residential mortgages were being securitized, about 45 percent of credit card loans were securitized, and about 10 percent of other consumer loans were securitized (Mishkin and Strahan, 1999). Thus, an interesting question for research is whether securitization will continue to spread. Will securitization of small business loans become as pervasive as in mortgage and consumer lending? What about lending to large businesses? And, how important are systematic data processing technologies in reducing the adverse selection problems that make assets illiquid and hard to securitize?

As a result of the increasing liquidity of financial assets, depository institutions have lost market share to mutual funds and pension funds. Between 1980 and 1998, for example, the share of all financial institution assets held by depositories fell from 58 percent to 31 percent, while the share

held by mutual funds and pension funds rose from 21 percent to 49 percent (Mishkin and Strahan, 1999). Moreover, the decline in the market share of intermediaries arguably understates the decline of traditional financial intermediation because an increasing share of the assets that remain on their balance sheets could be sold or securitized. This change reflects *disintermediation*; assets have migrated from intermediaries that provide asset transformation services, to financial institutions that provide very little or no asset transformation. (Mutual funds and pension funds hold mainly marketable securities as assets --commercial paper, corporate debt, mortgage-backed securities, government securities, etc.) As this discussion suggests, traditional intermediation has been declining for many years. An interesting research question looking ahead is whether e-finance technologies will push this process along, or whether banks and other intermediaries can use these technologies to encourage re-intermediation, as argued by Domowitz (this volume).

How will disintermediation affect monetary policy? By weakening the link between the liabilities and assets in the banking system, disintermediation creates a challenge for central bankers. The central bank has direct influence only over the liabilities of banks and other depository institutions, but innovations such as securitization allow banks to continue to originate loans even if funding becomes scarce. Monetary policy is thought to operate both through its effects on interest rates and through its effects on lending by banks. As bank lending becomes less important and less tied to their liabilities, however, this second "credit channel" of monetary policy may lose its potency (Lown and Morgan, 2001). Estrella (2001) in fact shows that securitization in mortgage markets has reduced the effects of a monetary policy shock and, at the same time, altered the channels through which those shocks operate. At a minimum, disintermediation complicates the life of the central banker by increasing the already substantial degree of uncertainty inherent in the job.

Another important question is whether disintermediation will change the way the financial system allows agents to share risks. Allen and Gale (1997) argue that bank-based financial systems eliminate risk through inter-temporal smoothing. Banks are able to build up reserves in good times and run them down in bad times. Disintermediation prevents this from happening because assets will be marked to the market and the current owners will obtain the full increase in value. The extent to which e-finance leads to this type of disintermediation remains an empirical issue.

### **Consolidation**

Consolidation in the banking sector has gone hand-in-hand with disintermediation, perhaps reflecting the joint effects of e-finance. At the same time that it lowers transactions and information costs, e-finance technologies raise scale economies. On the liability side, for example, electronic payments technologies require large fixed investments and often require networks that exhibit increasing returns. On the asset side, for example, credit scoring models rely on statistical analysis of default risks which perform better with larger databases, thus giving large lenders a significant advantage over their smaller competitors. Studies using the experience of the 1980s typically found very limited economies of scale in the banking industry, but more recent studies using data from the 1990s suggest scale economies up to \$10 to \$25 billion in assets. Although data limitations make it difficult to study effects of e-finance technologies directly, recent evidence suggests that electronic payments processing at the Federal Reserve Banks exhibit significant scale economies (Hancock, Humphrey and Wilcox, 1999).

In part as a result of these increased economies of scale, banking has consolidated very dramatically over the last decade. The largest 10 banking organizations in the U.S. accounted for

27 percent of all operating income in 1990, compared to their share of 45 percent in 1999. This trend toward increased consolidation, however, has been conspicuous by its absence in the rest of the financial services industry. In securities, for example, the share of revenue from the top 10 firms accounted for 57 percent of industry revenues in 1999, *down* from 64 percent in 1990 (Securities Industry Association, 2000). In life insurance, the share of assets held by the largest eight firms *fell* from 42 percent in 1988 to 35 percent in 1996, while in property & casualty insurance the share of assets held by the largest eight firms rose only slightly, from 33 percent in 1988 to 36 percent in 1996 (Berger, Demsetz and Strahan, 1999).

Given these facts, an important question is: why is banking the only segment in financial services to consolidate? Two key differences between banking and other financial institutions come to mind. First, banking was inefficiently balkanized during the 1970s and 80s because of regulations restricting both geographic and product markets. Thus, deregulation generated much of the consolidation of the past two decades (Jayaratne and Strahan, 1998). Second, e-finance technologies have had perhaps their greatest effect on the banking industry (and on other financial intermediaries), where the asset transformation role has been dramatically affected by reductions in transactions and information costs. While the role of the financial intermediary itself is threatened by e-finance technologies, the same can't be said for either securities firms, or other financial institutions that rely little on asset transformation (e.g. mutual funds, pension funds, or insurance companies). Because e-finance technologies bring large scale economies, it makes sense that we have seen much more consolidation in banking than in other parts of the financial services industry. Moreover, in the securities industry e-finance may explain some of the declines in consolidation as discount brokers experienced dramatic growth, thus taking market share away from the large, full-service investment banks.

From a public policy perspective, the consolidation in U.S. banking raises few antitrust concerns, at least over the short run. At the same time that e-finance technologies increase scale economies, they also lower barriers to entry into new markets, both geographic and product. Petersen and Rajan (2001) find that small businesses tend to borrow from more distant banks now than in the past, and that this increase in distance occurred because banks now use communications and information technologies more intensively when making credit decisions. While research of banking markets from the 1980s suggested that prices and profits were higher in more concentrated local markets, evidence from the 1990s is less supportive of the idea that local market concentration raises the price of banking services (Hannan 1997, Radecki 1998, Strahan and Hannan 2000).

Like the U.S., banking markets in Europe have been opened to greater competition with deregulation and the possibility of cross-border banking. Also like the U.S., consolidation has occurred in European banking, but most of this consolidation has been between banks operating in the same country. Danthine, Giavazzi, Vives and Von Thadden (1999) report the slow growth of cross-border banking in Europe during the 1990s. In 1992, for example, 4.7 percent of deposits held by French households and non-bank businesses were with foreign banks;

this percentage increased to just 5.8 percent by 1998. The figures did increase in France and in other European countries, but they increased quite slowly. It is an important research issue why European deregulation not yet created a single banking market. The relatively slow process of financial integration in Europe represents a significant puzzle, particularly because the deregulation occurred at a time when e-finance technologies have made it easier for customers to bank anywhere. Monetary union, to be completed in 2002, would seem to remove the last remaining explicit impediment to creating a unified banking and financial system in Europe.

### **Access to Credit**

How will e-finance technologies affect access to credit, particularly for borrowers that rely on a relationship with their lender? Small businesses tend to concentrate their borrowing at a single bank with which they have a long-term relationship, and the cost of credit seems to be lower when banks forge a relationship with them (Petersen and Rajan, 1994 and Berger and Udell, 1995). As banks invest more of their capital in automating the lending process, less may be available to invest in these relationships. This requires further research.

Beyond the direct effect on relationship customers, the competition and consolidation fostered by e-finance technologies can also conceivably harm the relationship-based customer. Some studies, for example, suggest that increased competition can hurt small and young firms by reducing the incentive for banks to forge long-term relationships with them (Petersen and Rajan, 1995, Boot and Thakor, 2000 and Marquez, forthcoming). In competitive markets, for example, it may be difficult for borrowers to commit to maintaining a long-term relationship. Lenders may therefore be less willing to offer credit on good terms early in the life of a firm because they have little confidence that they can recover their investment if the firm prospers.

Will consolidation also potentially harm relationship borrowers? Small banks have traditionally been important lenders to small firms, and some authors have argued that this role reflects their comparative advantage in relationship lending. Information stemming from a relationship is generated and controlled by a human being (the loan officer) rather than a machine (the computer), and small banks may be better able to control the agency problem that is generated by the private information held by the loan officer than a larger, more bureaucratic, bank.

While there may be theoretical reasons why increased competition and consolidation could reduce credit availability to relationship borrowers, one can argue the other side as well. The first-order effect of banking competition is to spur innovation and force prices closer to marginal costs. Moreover, increased bank size that comes with consolidation also ought to lower lending costs overall, both because size reduces the need to hold costly capital, and because banks' incentives to monitor their borrowers effectively are enhanced when their probability of failure is reduced through diversification (Diamond (1984)). The empirical evidence needed to sort this issue out remains inconclusive and further work is needed.